IR Sensor Module for Reflective Sensor, Light Barrier, and Fast Proximity Applications
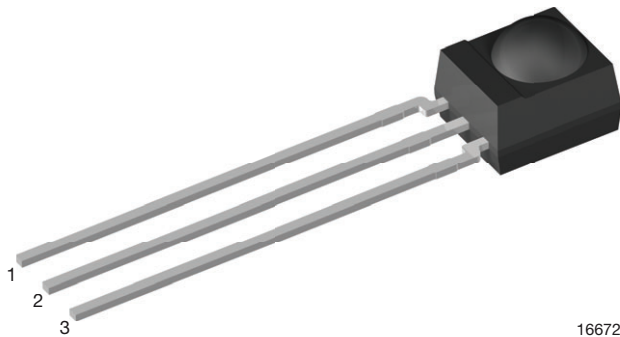
16672

LINKS TO ADDITIONAL RESOURCES

Product Page   3D Models   Calculators   Marking   Packages

Holders   Bends and Cuts

DESCRIPTION

The TSSP40.. series are compact infrared detector modules for presence and fast proximity sensing applications. They provide an active low output in response to infrared bursts at 940 nm. The frequency of the burst should correspond to the carrier frequency shown in the parts table.

This component has not been qualified according to automotive specifications.
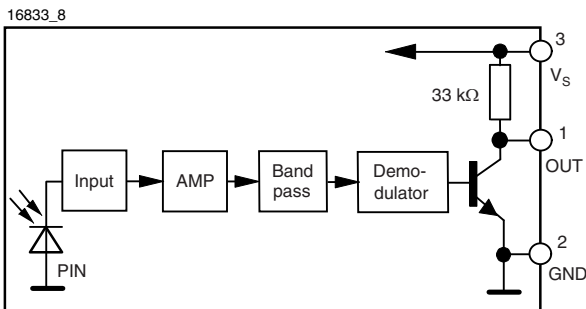
FEATURES

- Presence sensor: up to 2 m distance, find more info at: www.vishay.com/doc?49009
- Light barrier: up to 12 m distance, TSAL6200 with I_F = 50 mA, find more info at: www.vishay.com/doc?49650
- Fast proximity: up to 2 m range at 5 ms response time, find more info at: www.vishay.com/doc?82741
- Supply voltage: 2.5 V to 5.5 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

MECHANICAL DATA
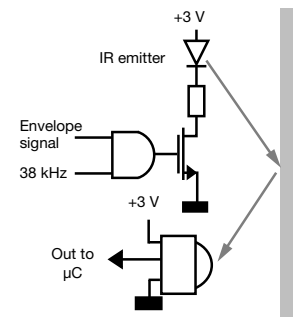
Pinning:

1 = OUT, 2 = GND, 3 = V_S

ORDERING CODE

TSSP40.. - 2160 pieces in tubes

APPLICATIONS

- Reflective sensors for hand dryers, towel or soap dispensers, water faucets, toilet flush
- Vending machine fall detection
- Security and pet gates
- Person or object vicinity switch
- Fast proximity sensors for toys, robotics, drones, and other consumer and industrial uses

BLOCK DIAGRAM

16833_8

PRESENCE SENSING

PARTS TABLE

Carrier frequency	38 kHz	TSSP4038
	56 kHz	TSSP4056
Package		Mold
Pinning		1 = OUT, 2 = GND, 3 = V_S
Dimensions (mm)		6.0 W x 6.95 H x 5.6 D
Mounting		Leaded
Application		Presence sensors, fast proximity sensors
Special options		• Narrow optical filter: www.vishay.com/doc?81590 • Wide optical filter: www.vishay.com/doc?82726

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage (pin 3)		V_S	-0.3 to +6.0	V
Supply current (pin 3)		I_S	5	mA
Output voltage (pin 1)		V_O	-0.3 to 5.5	V
Voltage at output to supply		$V_S - V_O$	-0.3 to (V_S + 0.3)	V
Output current (pin 1)		I_O	5	mA
Junction temperature		T_j	100	°C
Storage temperature range		T_{stg}	-25 to +85	°C
Operating temperature range		T_{amb}	-25 to +85	°C
Power consumption	$T_{amb} \leq 85$ °C	P_{tot}	10	mW

Note

• Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect the device reliability

ELECTRICAL AND OPTICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current (pin 3)	E_v = 0, V_S = 5 V	I_{SD}	0.55	0.7	0.9	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.8	-	mA
Supply voltage		V_S	2.5	-	5.5	V
Transmission distance	E_v = 0, test signal see Fig. 1, IR diode TSAL6200, I_F = 50 mA	d	-	12	-	m
Output voltage low (pin 1)	I_{OSL} = 0.5 mA, E_e = 2 mW/m^2, test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Pulse width tolerance: t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0, test signal see Fig. 1	$E_{e\ min.}$	-	0.4	0.7	mW/m^2
Maximum irradiance	t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0, test signal see Fig. 1	$E_{e\ max.}$	50	-	-	W/m^2
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	deg

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

Optical Test Signal
(IR diode TSAL6200, I_F = 0.4 A, 30 pulses, f = f_0, t = 10 ms)

E_e

t_{pi} *

T

* $t_{pi} \geq 10/f_0$ is recommended for optimal function

Output Signal   16110

V_O

V_{OH}

V_{OL}

1) $7/f_0 < t_d < 15/f_0$
2) $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$

t_d 1) t_{po} 2)

Fig. 1 - Output Active Low

λ = 950 nm,
optical test signal, Fig. 3

E_e - Irradiance (mW/m²)

t_{on}, t_{off} - Output Pulse Width (ms)
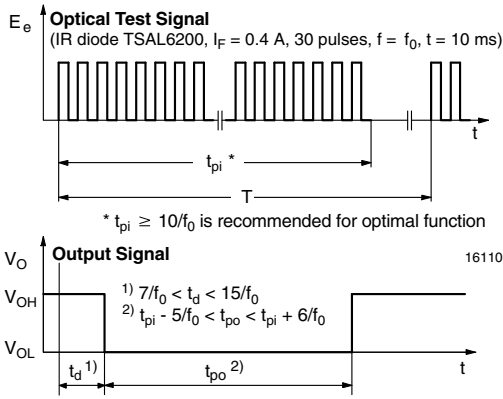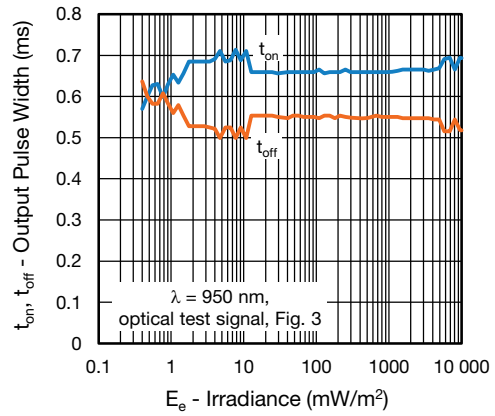
Fig. 4 - Output Pulse Diagram

t_{po} - Output Pulse Width (ms)

Output pulse width

Input burst length

λ = 950 nm,
optical test signal, Fig. 1

E_e - Irradiance (mW/m²)
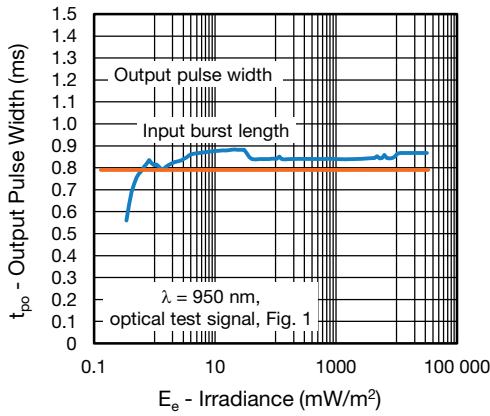
Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

$E_{e\ min.}/E_e$ - Relative Responsivity

f = f_0 ± 5 %
Δf(3 dB) = f_0/10

16925

f/f_0 - Relative Frequency
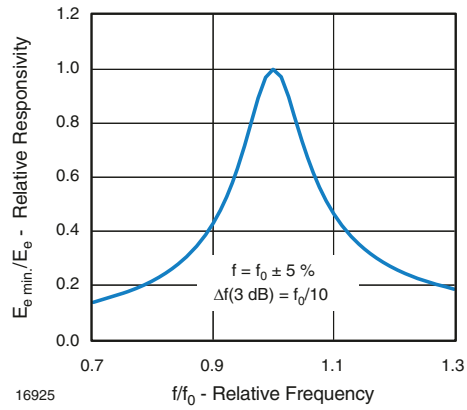
Fig. 5 - Frequency Dependence of Responsivity

Optical Test Signal

E_e

600 µs   600 µs

t = 60 ms

Output Signal, (see Fig. 4)   94 8134

V_O

V_{OH}

V_{OL}

t_{on} t_{off}

Fig. 3 - Output Function

$E_{e\ min.}$ - Threshold Irradiance (mW/m²)

T_{amb} - Ambient Temperature (°C)
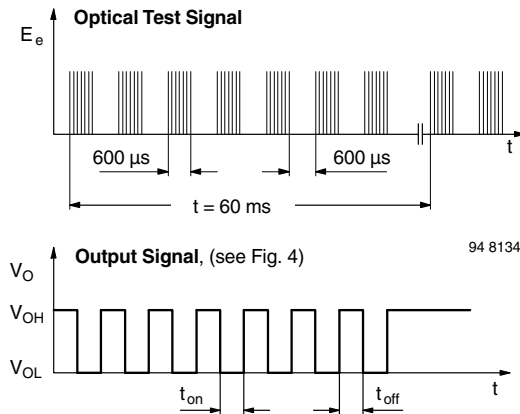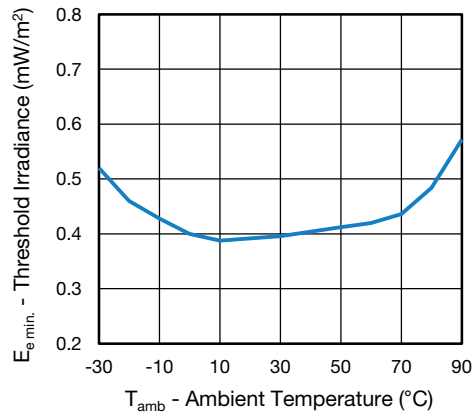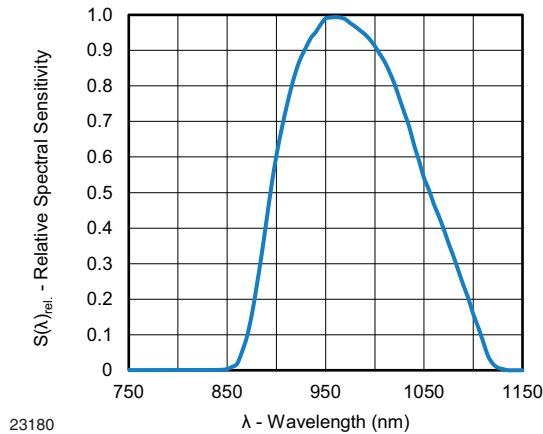
Fig. 6 - Sensitivity vs. Ambient Temperature

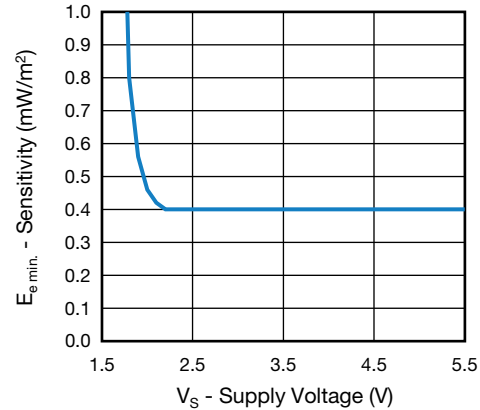Fig. 7 - Relative Spectral Sensitivity vs. Wavelength
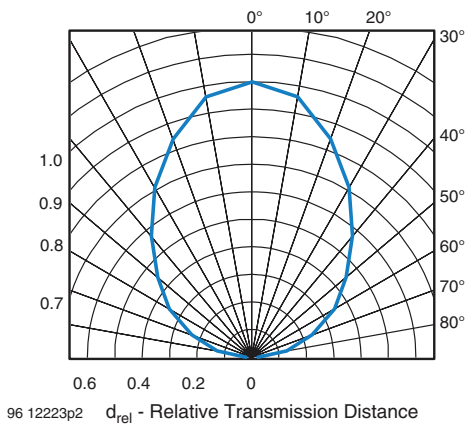

Fig. 9 - Sensitivity vs. Supply Voltage

Fig. 8 - Directivity

The typical application of these devices is a reflective or beam break sensor with active low "detect" or "no detect" information contained in its output. The TSSP4056 is also suitable for fast (~ 5 ms) proximity sensor applications for ranges between 10 cm and 2 m. Please see application note "Vishay's TSSP4056 Sensor for Fast Proximity Sensing" (www.vishay.com/doc?82741).

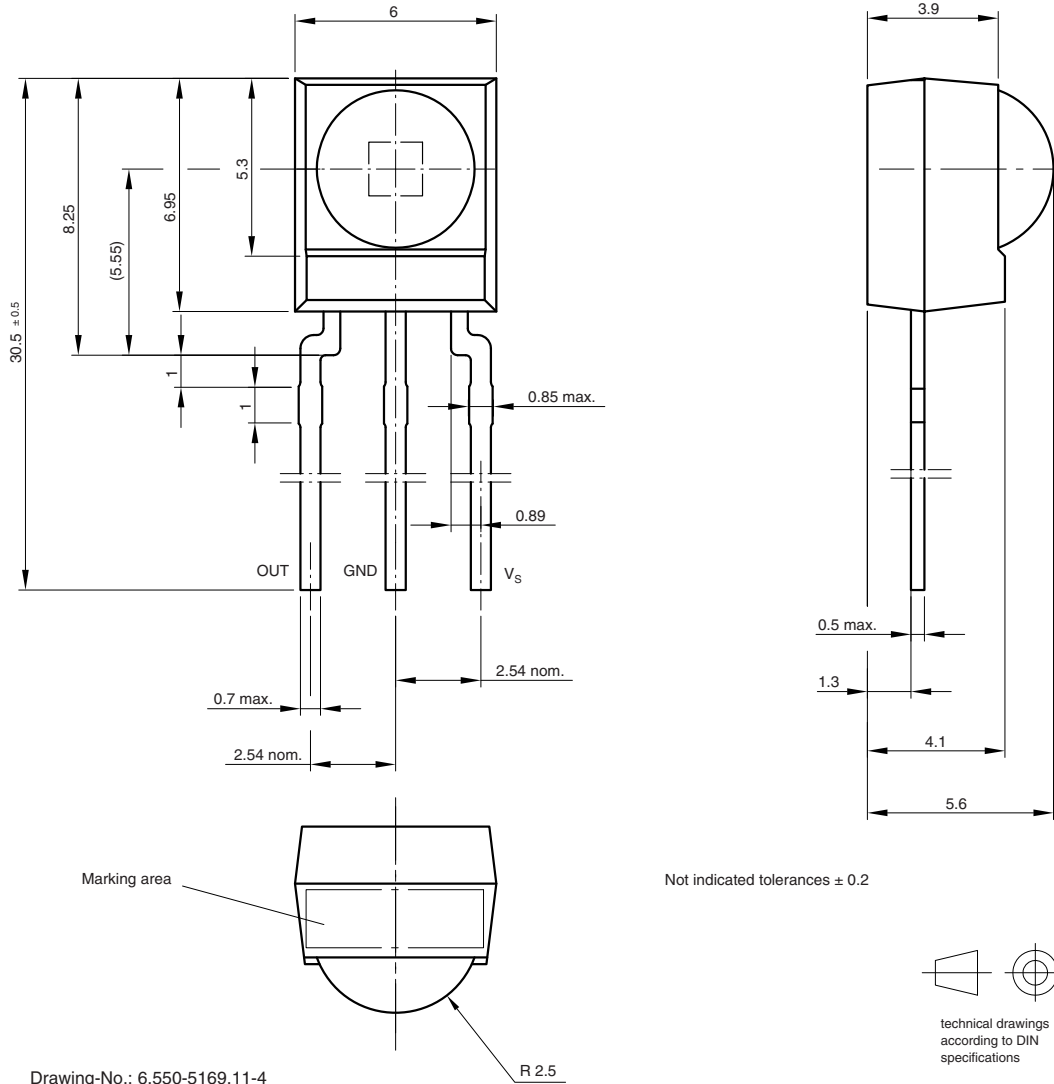Example for a sensor hardware:

IR detector

IR emitter

Separation to avoid crosstalk by stray light inside the housing
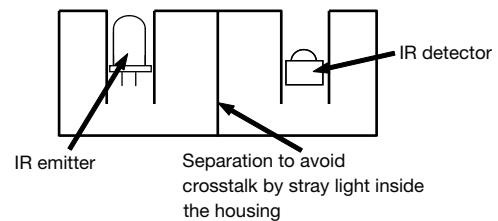
There should be no common window in front of the emitter and detector in order to avoid crosstalk via guided light through the window.

PACKAGE DIMENSIONS in millimeters

OUT   GND   V_S

Marking area

Drawing-No.: 6.550-5169.11-4

Issue: 13; 17.12.08

16003

Not indicated tolerances ± 0.2

technical drawings
according to DIN
specifications

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